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EXAMINER	
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2628	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/901,611	Applicant(s) ELBER, GERSHON	
	Examiner Kimbinh T. Nguyen	Art Unit 2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 July 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8,10-26 and 28-51* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8,10-23,25,26,28-49,51* is/are rejected.

7)☒ Claim(s) *24 and 50* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This action is responsive to amendment filed 07/28/06.

2. Claims 1-8, 10-26, 28-51 are pending in the application.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-8, 10, 11, 13-15, 25, 26, 29, 31-39, 41, 42, 46 and 51 are rejected under 35 U.S.C. 102(e) as being anticipated by Deering et al. (6,559,842).

Claim 1, Deering et al. discloses a graphical data-compressor (a compression program) for compression of received, arbitrary graphical data for subsequent transmission (col. 3, lines 45-59), said graphical data-compressor comprising an input for reception of said received arbitrary graphical data (graphics system 100 receives compressed 3D geometry data from input bus 10; col. 9, line 67 through col. 10, line 1, lines 50-54), and a transmitter linked (Internet links, cable links, phone lines) to said functional scene describer for transmission of said analytic description (col. 8, lines 11-20); an analyzer linked to said input and operable for analysis of said received arbitrary graphical data into constituent geometrical parts (control unit 190), where at least some of said constituent geometric parts comprise predetermined shapes and forms (other

types of primitives (dots, lines, polygons, subdivision surfaces, Bezier or NURB surfaces or curves, volume elements and control surfaces); col. 6, lines 36-44; col. 11, lines 58-67); and a scene describer, linked to said analyzer (decompressor 12; col. 14, lines 25-30) for description of said at least some of said constituent geometrical parts as a procedural description of said received arbitrary graphical data, where said procedural description comprises a high level 3D functional form representing one of said constituent geometrical parts (col. 14, lines 30-59); and a transmitter linked to the procedural description (col. 3, lines 56-59).

Claims 2 and 33, since the applicants on p.12 of the specification defined indexing as a label of an underlying shape and parameters for adapting said underlying shape to reconstruct an original shape, and it is obvious to identify parts of compressed data that need to be restored at decompression time before compression occurs, Deering must disclose indexing in figs. 7 and 8, col. 3, lines 28-57.

Claim 3, Deering et al. discloses arbitrary graphical data in a format selected from a polygonal graphic representation, a point cloud, an ordered piecewise mesh, or (piecewise) polynomial and rational forms and polynomial, rational and freeform functions (ordered piecewise mesh; FIG. 6).

Claims 4 and 35, Deering et al. discloses said analyzer for analysis of said graphical data into constituent geometrical parts comprising a pattern matcher matching with a predetermined shape (col. 2, lines 33-60).

Claim 5, Deering et al. discloses said constituent geometrical part is a predetermined shape (col. 16, lines 12-13), and said analytic description comprises a functional representation of said predetermined shape (col. 16, lines 14-19).

Claim 6, Deering et al. discloses said functional representation comprising a basic underlying shape (16x16 mesh of vertices as previously noted) together with parameters (col. 16, lines 15-19).

Claim 7, Deering et al. discloses said received arbitrary input data comprising a plurality of data points in space (col. 1, lines 46-65; fig. 1).

Claim 8, Deering et al. disclose an applicator for applying a surface fitting function to fit said plurality of data points in space in order to represent said plurality of data points in a format suitable for said analyzer (texture map coordinate; col. 1, lines 48-65).

Claims 10 and 39, Deering et al. discloses said predetermined shape as being selected from any one of a group comprising lines, curves, planar freeform surfaces, surfaces of revolution, spherical faces, conical faces, cylindrical faces, torroidal faces, ruled surfaces, extrusion surfaces, sweep surfaces, additive combinations thereof and trimmed combinations thereof (B-splines curves, subdivision surfaces; col. 11, lines 56-65).

Claim 11, Deering et al. discloses said scene describer operable to select said predetermined shape for said constituent geometrical part by analysis of said constituent geometric part to determine fulfillment of conditions associated with said predetermined shape (col. 21, line 61 through col. 22, line 11).

Claims 13, 41 and 42, Deering et al. discloses said procedural description as comprising at least a label of an underlying shape (designated vertices (i.e., those followed by a "p") and parameters for adapting said underlying shape to reconstruct an original shape (col. 2, line 33 through col. 3, line 43).

Claim 14, Deering et al. discloses said parameters comprising at least one of a group comprising an orientation, a scale, dimensional parameters and a location (the local orientation, the xyz coordinates of the vertex, normal; col. 2, lines 1-8).

Claim 15, Deering et al. discloses the label as an index (index of refraction information; col. 26, lines 19-20).

Claim 25, Deering et al. teaches a register of predetermined shapes and forms (registers 10A-N; fig. 17); an analytic form fitter for associating said predetermined shapes and forms with said geometrical parts (they are convey to set up/draw units 22A-N, compressed graphic 208 may include predefined control information; col. 14, lines 35-59), Deering does not teach the surface fitting function for fitting said constituent geometrical parts of arbitrary graphical data with functions selected from a group comprising Bezier freeform functions, B-spline freeform functions, NURBS, piecewise polynomial equations and rational equations. However, Krishnamurthy teaches at col. 11, lines 4-15). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the fitting technique taught by Krishnamurthy into the mesh compression structure of Deering, because it would provide a useful method for converting dense irregular polygon meshes into surface models suitable for interactive modification and animation (abstract).

Claim 26, Deering et al. discloses said predetermined shape as being selected from any one of a group comprising lines, curves, planar freeform surfaces, surfaces of revolution, spherical faces, conical faces, cylindrical faces, torroidal faces, ruled surfaces, extrusion surfaces, sweep surfaces, additive combinations thereof and trimmed combinations thereof (B-splines curves, subdivision surfaces; col. 11, lines 56-65).

Claim 28, the rationale provide in the rejection of claim 1 and claim 16 is incorporated herein.

Claim 29, Deering et al. discloses an indexer positioned (xyz position coordinates between said analyzer and said transmitter for indexing said analytic description into an indexed description (col. 16, line 12 through col. 17, line 62).

Claim 31, Deering et al. discloses said data link selected from a group comprising a LAN, WAN, the Internet, a dedicated land link, a dedicated link through the atmosphere, a radio-wave link, and a microwave link (Internet links; col. 8, lines 13-20).

Claim 32, Deering et al. discloses a method for compressing arbitrary graphical data (compressing or rendering scenes or objects that includes multiple instances of 3D objects that vary primarily according to attribute settings; col. 6, lines 12-15), comprising analyzing said arbitrary graphical data into constituent geometric parts, where at least some of said constituent geometric parts comprise predetermined shapes and forms (other types of primitives (dots, lines, polygons, subdivision surfaces, Bezier or NURB surfaces or curves, volume elements and control surfaces); col. 6, lines 36-44; col. 11, lines 58-67), describing said constituent geometrical parts as procedural description of

said constituent geometrical parts of said arbitrary graphical data, where said procedural description comprises a high level 3D functional form representing at least one of said constituent geometrical parts (the 3D graphics data includes NURBs, volume elements, subdivision surfaces, meshes; col. 11, lines 62-67), and transmitting said procedural description (col. 3, lines 44-59).

Claim 34, Deering et al. discloses arbitrary graphical data in a format selected from a polygonal graphic representation, a point cloud, an ordered piecewise mesh, or (piecewise) polynomial and rational forms and polynomial, rational and freeform functions (fig. 6).

Claim 36, Deering et al discloses describing comprises representing by procedural representation (col. 11, lines 58-67).

Claim 37, Deering et al. discloses said received arbitrary input data, the arbitrary image data comprises a plurality of data points in space (fig. 1).

Claim 38, Deering et al. discloses said analyzer for analysis of said graphical data into constituent geometrical parts comprising a pattern matcher matching with a predetermined shape (col. 2, lines 33-47).

Claim 46, the rationale provided in the rejection of claim 1 is incorporated herein. In addition, Deering et al. teaches a geometrical part compressor operatively associated with the scene describer and the analyzer, for reduction of constituent geometric parts not described by the describer, into a reduced quantity of data (reducing the size of the 3D graphic data bandwidth may be saved; col. 3, lines 44-59).

Claim 51, the rationale provided in the rejection of claim 1 is incorporated herein, because Deering also teaches compressing 3D geometry data (col. 26, lines 1-2).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claim rejected under 35 U.S.C. 103(a) as being unpatentable over Deering et al. (6,559,842) in view of Go (6,101,277).

Claim 12, Deering et al. does not explicitly disclose the predetermined shape modifiable by trimming. However, this element is disclosed by the Go image encoding and decoding method at col. 17, line 66 to col.18, line 24.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Deering geometry compression method in view of the Go image encoding and decoding method by placing the Go reduced image encoder 25 (FIG. 1) in the Deering 3-D graphics compression. Such a modification would enable edges to be encoded more efficiently (Go, col.18, lines 19-20).

7. Claims 16, 17, 30, 43-45 are rejected under 35 U.S.C. 5 103(a) as being unpatentable over Deering et al. (6,559,842) in view of Kono (4,772,947).

Claim 16, Deering et al. discloses a graphics decompressor comprising a receiver for reception of arbitrary graphical data (col. 14, lines 25-26), analyzed into

constituent geometrical parts, where at least some of the constituent geometric parts comprise predetermined shapes and forms and described in a 3D functional form (other types of primitives (dots, lines, polygons, subdivision surfaces, Bezier or NURB surfaces or curves, volume elements and control surfaces); col. 6, lines 36-44; col. 11, lines 58-67); a 3D geometry evaluator, following said receiver, for evaluation of said graphical data, in respect of a predetermined set of basic shapes and forms stored at said decompressor (decompressors 12A-N; col. 14, lines 25-67). Deering does not disclose a piecewise linear surface approximator following said geometry evaluator for reconstruction of said evaluated data on a piecewise basis, into geometrical entities. This is disclosed by the Kono method and apparatus for transmitting compressed data (col. 2, line 66 to col. 3, line 48, especially col. 3, lines 4-31). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Deering geometry compression method in view of the Kono method by inserting the Kono reconstruction unit 15 (FIG.1) into the Deering encoding method. Such a modification would allow for smaller compression of each geometrical entity, thereby allowing for more data to be transmitted at a time (Kono, col. 11, lines 1-16).

Claim 17, Deering et al. discloses said compressed functional form as comprising elements having a basic shape (the vertices from object space, predetermined mesh size) associated with parameters (connectivity information including xyz position, color information, normal information, texture mapping information; col. 10, lines 8-14, col. 16, lines 12-19).

Claims 30 and 44, Kono discloses a piecewise linear surface approximator

in a decompressor (col.10, lines 13-46).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Deering geometry compression method in view of the Kono method by inserting the Kono reconstruction unit 15 (FIG.1) in the Simons encoder 42 (FIG. 7). Such a modification would allow for smaller compression of each geometrical entity, thereby allowing for more data to be transmitted at a time (Kono, col. 11, lines 1-16).

Claim 43, Deering et al. discloses evaluating said functional description in terms of said plurality of high level functional forms, the functional forms being selected from a group comprising: Bezier freeform function, B-spline freefrom functions, NURBS (col. 11, lines 54-67).

Claim 45, Kono discloses converting said piecewise linear surface approximation into polygonal geometry (col. 10, lines 13-46), in reconstructing luminance values for each block, Kono aids in reconstructing individual (four-sided) blocks, which are polygons).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Deering geometry compression method in view of the Kono method by inserting the Kono reconstruction unit 15 (FIG. 1) in the Simons encoder 42 (FIG.7). Such a modification would allow for smaller compression of each geometrical entity, thereby allowing for more data to be transmitted at a time (Kono, col. 11, lines 1-16).

8. Claims 18-23 are rejected under 35 U.S.C. 5 103(a) as being unpatentable over Deering et al. (6,559,842) in view of Deering (6,525,722).

Claims 18-20, Deering (6,525,722) discloses a graphics decompressor wherein said reconstruction into geometrical entities is at a selectable resolution level, and said resolution level is selectable in accordance with a context of the data within a scene, said context being a relationship of the data to a background and a foreground within the scene (col. 49, lines 55-57;col. 43, lines 38-48).

Claims 21-22, Deering (6,522,722) does not explicitly disclose said selectable resolution level being determinable by available computer resources, said available computer resources being any one of a group comprising memory availability, processor capability, and available processing time. However, it would be obvious to a person skilled in the art at the time the invention was made that any computer-driven operation would be determinable by the availability of any computer resource, including memory or processor availability or available processing time. It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate a selectable resolution level taught by Deering (6,525,722) into the compressing and decompressing graphics data using direct and indirect attribute setting of Deering (6,559,842), because moving the transition from low resolution into high resolution or half resolution, it would allow more realistic visual effects (col. 43, lines 66-67).

Claim 23, Deering et al. discloses said predetermined shape as being selected from any one of a group comprising lines, curves, planar perform surfaces, surfaces of

revolution, spherical faces, conical faces, cylindrical faces, torroidal faces, ruled surfaces, extension surfaces, sweep surfaces, additive combinations thereof and trimmed combinations thereof (col. 13, lines 30-32).

9. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Deering et al. (6,559,842) in view of Go (6,101,277).

Claim 40, Deering et al. does not explicitly disclose the predetermined shape modifiable by trimming. However, this element is disclosed by the Go image encoding and decoding method at col.17, line 66 to col.18, line 24.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Deering geometry compression method in view of the Go image encoding and decoding method. Such a modification would enable edges to be encoded more efficiently (Go, col.18, lines 19-20).

10. Claims 47-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Deering et al. (6,559,842) in view of Lyche et al. “Knot removal for parametric B-spline curves and surfaces" Lyche").

Claim 47, Although Deering et al. discloses a geometrical part compressor, Deering does not disclose a geometrical part expressable as at least one spline having knots and a knot remover for identifying and removing knots having no effect on reproduction of the part. However, these elements are disclosed, directly or indirectly, by Lyche.

The first paragraph of Section 2, “coefficient norms for B-spline curves and surfaces," on p.218 discloses a parametric B-spline curve with knots. Knot removal is

disclosed in the third paragraph of the same section. Item 10 on p.229 states that knot removal can be applied to data compression.

Lyche does not address the issue of reproduction of the geometric part. However, since Deering discloses lossless compression at col. 9, lines 6-8, this element is disclosed as well.

Claim 48, Lyche discloses a pattern identifier for identifying patterns of knots (which knots are most significant in representing the spline where the knots reside; see "3. Knot removal for parametric B-spline curves," fourth paragraph, pp.220-221) and an indexer for replacing each identified pattern with an index (weights are used as indexes to indicate the significance of a knot; see "3. Knot removal for parametric B-spline curves," fourth paragraph, pp.220-221).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Deering geometry compression method in view of the Lyche discussion on knot removal. Such a modification would minimize storage usage by storing polygons with fewer points (Lyche, Item 10, p.229).

11. Claim 49 is rejected under 35 USC 103(a) as being unpatentable over Deering et al. (6,559,842) in view of Demmel, "Applied Numerical Linear Algebra".

Claim 49, Deering et al. does not disclose a least squares approximator reducing said geometrical part into a least squares approximation. However, this is disclosed by the Demmel linear algebra textbook example at pp. 114-117.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Deering geometry compression

method in view of Demmel's application to a linear algebra theorem to compression. Such a modification would minimize storage usage by permitting storage of many fewer numbers in the compression process (Demmel, p.114 before full paragraph).

Allowable Subject Matter

12. Claims 24 and 50 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

13. Applicant's arguments with respect to claim have been considered but are moot in view of the new ground(s) of rejection.

With respect to applicants' arguments, Deering (6,525,,722) teaches compression of 3D geometry data arbitrary size and shape and Deering (6,559,842) teaches compressing and decompressing graphics data of arbitrary information data using direct and indirect attribute setting, using 3D functional forms: NURBs, volume elements, subdivision surfaces, mesh and other techniques, transmitting over computer network and small computer programs. The 3D compression data based on transformation and lighting calculations for bandwidth reduction benefits.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kimbinh T. Nguyen whose telephone number is (571) 272-7644. The examiner can normally be reached on Monday to Thursday from 7:00 AM to 4:30 PM. The examiner can also be reached on alternate Friday from 7:00 AM to 3:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Razavi can be reached at (571) 272-7664. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

October 6, 2006

Kimbinh Nguyen

KIMBINH T. NGUYEN
PRIMARY EXAMINER